Diabetes During Pregnancy — United States, 1993–1995

Diabetes during pregnancy, whether pregestational (type 1 or type 2) or gestational, increases the risk for adverse maternal and infant outcomes (e.g., congenital anomalies, cesarean delivery, macrosomia, and future metabolic abnormalities) (*1–3*). Identification and careful management of diabetes during pregnancy can reduce poor maternal and infant outcomes (*4–6*). Diabetes prevalence and prenatal-care use varies among racial/ethnic groups and by maternal age and other characteristics (*1,7,8*). Higher than expected diabetes rates for women of childbearing age have been reported among many immigrant and other populations undergoing lifestyle changes (e.g., physical activity and diet) (*1*). This report summarizes an analysis of U.S. birth certificates during 1993–1995 to describe maternal diabetes and associated prenatal care among racial/ethnic groups and updates a previous report (*7*).

U.S. birth certificate data for all resident singleton, live-born infants for 1993–1995 were combined to improve reliability of race/ethnicity–specific diabetes rates. Maternal characteristics included age at delivery, self-reported race/ethnicity, birthplace (defined as born within or outside the 50 states and the District of Columbia), the month

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that prenatal care was initiated, and whether diabetes was reported as a medical risk factor for the pregnancy. Maternal diabetes is reported on a checkbox on the birth certificate; however, the type of diabetes (pregestational or gestational) is not recorded. Data for Asian Indian, Korean, Samoan, and Vietnamese women were available for seven states (California, Hawaii, Illinois, New Jersey, New York, Texas, and Washington). Age-adjusted diabetes rates were calculated to account for differences in the maternal age distributions of the racial/ethnic and birthplace groups. Age-adjusted rates were standardized to the U.S. maternal age distribution for 1993–1995 singleton live births. Rates with numerators <20 were not calculated because numbers were too small to provide stable estimates. Proxy measures of the possibility of adequate diabetes screening and treatment included 1) the proportion of mothers with diabetes who entered care after the first trimester as a measure of inadequate care for pregestational diabetes, and 2) the proportion of mothers who entered prenatal care in the eighth or ninth month (i.e., late care) or who received no prenatal care as a measure of inadequate or no screening or treatment.

During 1993–1995, the maternal diabetes rate was 25.3 per 1000 women (Table 1). Prevalence rates by maternal race/ethnicity ranged from 56.1 for Asian Indian women to 19.3 for Korean women. Diabetes rates increased steadily with age from 8.3 per 1000 women aged <20 years to 65.6 for women aged 40–49 years. Age-adjusted rates were higher than unadjusted rates for American Indian, non-Hispanic black, Mexican, Puerto Rican, Hawaiian, and Samoan women and lower for Asian Indian, Chinese, Japanese, Filipino, Korean, Vietnamese, Central and South American, Cuban, and non-Hispanic white women (*7*). Age-adjusted diabetes rates were highest among American Indian (52.4), Asian Indian (48.3), Puerto Rican (38.7), Hawaiian (32.6), and Filipino (32.0) women and lowest among Korean (16.1) and Vietnamese (19.5) women.

Overall, mothers born outside the United States had a higher diabetes rate than U.S.-born women (unadjusted: 28.0 compared with 24.8; adjusted: 26.4 compared with 25.0) (Table 2). However, the effect of birthplace varied by race/ethnicity. Both before and after adjusting for age, diabetes rates were at least 25% greater among Asian Indian, Samoan, and non-Hispanic black women who were born outside the United States than among U.S.-born women; however, Japanese women born in the United States were more likely to have diabetes than those born outside the United States.

Mothers with diabetes were more likely than mothers without diabetes to initiate prenatal care during the first trimester and less likely to initiate care during the eighth or ninth month of gestation or to receive no care, regardless of race/ethnicity (Table 3). Among mothers with diabetes, first-trimester initiation of care ranged from 59.0% among Samoan women to 90.4% of Cuban women. Among groups with the highest diabetes prevalence, the percentage of women with diabetes receiving care during the first trimester was 88.4% among Chinese, 85.6% among Filipino, 82.6% among Asian Indian, 77.1% among Puerto Rican, and 71.1% among American Indian women.

An average of 105,122 mothers per year initiated prenatal care during the eighth or ninth month of pregnancy or received no care. Approximately half of these women were non-Hispanic black or Mexican. Among mothers with diabetes, 1.3% had late or no prenatal care, including 3.3% of American Indian, 2.9% of Central/South American, 2.8% of Asian Indian, 2.4% of Mexican, 2.3% of Puerto Rican, and 2.2% of black non-Hispanic women. Among Chinese and Filipino mothers with diabetes, 1.0% had

TABLE 1. Number and rate* of diabetes during pregnancy, by race/ethnicity and age of mother — United States, 1993–1995

Race/Ethnicity	No.†	Age (yrs) of mother						Total	
		<20	20–24	25–29	30–34	35–39	40–49	Unadjusted	Age-adjusted§
Non-Hispanic									
White	6,996,046	10.0	17.8	24.5	30.3	41.3	56.1	**25.3**	**24.3**
Black	1,770,102	6.5	14.0	26.1	40.3	57.4	81.1	**22.6**	**27.5**
Hispanic									
Mexican	1,331,361	6.4	12.5	23.7	41.9	63.8	88.8	**22.8**	**27.5**
Puerto Rican	161,065	8.8	21.4	36.3	56.9	79.7	107.7	**31.6**	**38.7**
Cuban	35,148	¶	14.7	23.6	30.2	40.4	53.4	**24.9**	**22.7**
Central or South American	271,639	5.6	11.4	21.7	35.8	56.4	79.9	**25.4**	**24.3**
American Indian/ Alaskan Native	108,982	12.9	26.8	49.5	77.3	110.2	150.6	**43.9**	**52.4**
Asian/Pacific Islander									
Chinese	77,359	¶	11.5	26.7	40.4	60.8	75.1	**39.1**	**27.3**
Japanese	25,885	¶	20.3	16.9	26.3	37.4	67.4	**26.8**	**21.6**
Hawaiian	16,982	11.4	16.8	33.3	47.5	67.1	¶	**28.9**	**32.6**
Filipino	88,487	8.0	16.2	28.8	47.5	69.5	100.0	**39.8**	**32.0**
Asian Indian**	31,574	¶	26.0	45.2	70.5	109.9	108.0	**56.1**	**48.3**
Korean**	24,918	¶	9.0	13.3	22.9	31.0	48.6	**19.3**	**16.1**
Samoan**	4,855	¶	¶	27.4	42.4	69.8	¶	**25.7**	**28.7**
Vietnamese**	34,140	¶	6.5	16.6	34.6	41.4	70.8	**24.3**	**19.5**
Total††	**11,384,926**	**8.3**	**16.3**	**25.1**	**33.8**	**47.4**	**65.6**	**25.3**	**—**

* Per 1000 singleton live-born infants in specified population.
† Women for whom diabetes status was reported.
§ Directly standardized to the aggregate population of all race/ethnicities.
¶ Numbers were too small for meaningful analysis.
** Data available for seven states (California, Hawaii, Illinois, New Jersey, New York, Texas, and Washington).
†† Includes races other than those listed.

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TABLE 2. Number and rate* of diabetes for women born in the 50 states and the District of Columbia (DC) and for women born elsewhere, by race/ethnicity — United States, 1993–1995

	Women born in 50 states and DC			Women born elsewhere		
Race/Ethnicity	No.†	Unadjusted rate	Adjusted rate	No.†	Unadjusted rate	Adjusted rate
Non-Hispanic						
White	6,653,662	25.2	24.3	332,677	27.2	23.0
Black	1,618,276	21.2	26.6	143,659	39.5	33.4
Hispanic						
Mexican	494,906	23.2	31.1	834,834	22.5	25.7
Puerto Rican	96,380	28.0	36.2	64,137	37.0	41.4
Cuban	11,945	23.0	24.3	23,181	25.8	21.4
Central or South American	18,347	17.6	21.3	252,773	26.0	24.3
American Indian/ Alaskan Native	104,322	44.0	53.0	4,442	43.0	42.1
Asian/Pacific Islander						
Chinese	6,914	39.1	28.6	70,171	39.0	27.1
Japanese	12,175	35.3	27.7	13,681	19.3	15.6
Hawaiian	16,568	28.8	32.7	410	§	33.2
Filipino	13,771	26.8	29.9	74,566	42.2	32.0
Asian Indian¶	3,627	38.3	34.0	27,841	58.5	50.3
Korean¶	844	§	§	24,023	19.1	16.1
Samoan¶	1,845	15.2	17.7	3,005	32.3	31.0
Vietnamese¶	351	§	§	33,745	24.3	19.4
Total**	**9,280,027**	**24.8**	**25.0**	**2,078,873**	**28.0**	**26.4**

*Per 1000 singleton live-born infants in specified population.
†Women for whom place of birth and diabetes status were reported.
§Numbers were too small for meaningful analysis.
¶Data were available for seven states (California, Hawaii, Illinois, New Jersey, New York, Texas, and Washington).
**Includes races other than those listed.

late or no prenatal care. The percentage of mothers without diabetes who had late or no care ranged from 1.1% of Cuban mothers to 8.7% of Samoan mothers, including ≥4% of American Indian, Mexican, non-Hispanic black, Puerto Rican, and Central and South American mothers. Late or no prenatal care among all mothers within these racial/ethnic groups was consistently higher regardless of maternal age.

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Editorial Note: During 1993–1995, at least 2.5% of women who had a live-born infant had maternal diabetes, slightly higher than the 2.1% reported for 1989 (*9*). This difference may reflect, in part, improved reporting rather than an increase in diabetes prevalence. These data probably underestimate the true prevalence of diabetes during pregnancy (*1,8–10*). Prevalence estimates have been higher in most universally screened clinic populations (*1*).

Prevalence underestimation may have been greater in populations that were less likely to receive diabetes screening because of younger maternal age distributions

TABLE 3. Percentage distribution of month prenatal care began and annual average number of women with late, inadequate, or no prenatal care, by race/ethnicity and diabetes status of mother — United States, 1993–1995

Race/Ethnicity	No.*	1–3 months		4–7 months		8–9 months or no care		Average no. of mothers per year with late or no care†	Average no. of mothers per year with inadequate or no care§
		With diabetes	Without diabetes	With diabetes	Without diabetes	With diabetes	Without diabetes		
Non-Hispanic									
White	6,987,365	89.2	86.2	10.1	12.3	0.8	1.5	35,233	319,333
Black	173,029	77.3	67.9	20.5	26.6	2.2	5.5	31,539	183,867
Hispanic									
Mexican	1,313,659	72.0	66.9	25.6	27.6	2.4	5.6	24,047	144,495
Puerto Rican	155,355	77.1	71.6	20.6	24.5	2.3	4.0	2,023	14,627
Cuban	34,927	90.4	89.3	8.7	9.6	¶	1.1	132	1,241
Central or South American	263,138	71.8	71.0	25.3	25.0	2.9	4.0	3,482	25,452
American Indian/ Alaskan Native	108,831	71.1	64.7	25.6	29.1	3.3	6.2	2,111	12,705
Asian/Pacific Islander									
Chinese	76,028	88.4	85.4	10.5	13.0	1.1	1.7	415	3,681
Japanese	25,429	90.2	88.6	9.1	10.0	¶	1.4	115	961
Hawaiian	16,373	79.8	74.3	19.6	22.4	¶	3.3	175	1,392
Filipino	87,176	85.6	80.3	13.3	17.5	1.0	2.3	641	5,671
Asian Indian**	30,675	82.6	81.5	14.6	16.0	2.8	2.5	261	1,888
Korean**	24,111	80.8	79.8	17.7	17.7	¶	2.6	203	1,623
Samoan**	4,673	59.0	56.1	36.1	35.2	¶	8.7	134	682
Vietnamese**	33,344	85.1	81.4	13.1	16.2	¶	2.5	272	2,061
Total††	**11,286,002**	**84.3**	**79.9**	**14.4**	**17.3**	**1.3**	**2.8**	**105,122**	**751,673**

* Women for whom month prenatal care began and diabetes status were reported.
† Care beginning in the eighth or ninth month of pregnancy or no care.
§ Care beginning after the third month of pregnancy or no care.
¶ Numbers were too small for meaningful analysis.
** Data available for seven states (California, Hawaii, Illinois, New Jersey, New York, Texas, and Washington).
†† Includes races other than those listed.

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and/or late or no prenatal care. Selective screening based on maternal age does not detect a substantial number of diabetes cases. Age and racial/ethnic differences in the timing and adequacy of prenatal care also may have influenced reported prevalence rates because all but the most overt cases of gestational diabetes may have remained undetected in women who initiated prenatal care in the eighth or ninth month of pregnancy or who received no care.

Preconception counseling and treatment is recommended for all women with pregestational diabetes. Screening to detect gestational diabetes is recommended during weeks 24–28 of pregnancy, followed by treatment during the remainder of pregnancy and postpartum follow-up (*4,6*). Initiation of prenatal care after the first trimester precludes adequate treatment of women with pregestational diabetes, and late or no prenatal care minimizes adequate screening and treatment of gestational diabetes. Among mothers with diabetes, approximately 20% of non-Hispanic black, Hispanic (except Cuban), American Indian, Samoan, and Hawaiian women initiated care after the first trimester.

Diabetes prevalence increased with maternal age regardless of race/ethnicity. Both older age and increased screening of older mothers may contribute to the age-associated rate increase. The older childbearing ages of Filipino and Chinese women, compared with the reference population, accounts for their lower adjusted rates. In comparison, the age-adjusted diabetes rate for Asian Indian women remained substantially higher than the rate for all other groups despite their older maternal age distribution.

Differences in childbearing age distributions by birthplace may account for some of the variation in diabetes rates between U.S.-born women and those born elsewhere. U.S.-born women generally have younger childbearing ages than women born elsewhere. However, diabetes rate differences by birthplace were not solely attributable to differing age distributions among most ethnic groups.

The findings in this report are limited by the inability to distinguish between pregestational and gestational diabetes on birth certificates. The inclusion of such data on birth certificates is being considered.

Recent studies suggest that the prevalence of diabetes among women of childbearing age is increasing in the United States (*10*). Increasing immigration among populations with high rates of type 2 diabetes, and the impact of acculturation on these risks (*1*), underscores the importance of national surveillance for diabetes prevalence during pregnancy (*7–9*). Identifying and monitoring the prevalence of pregestational diabetes may assist in targeting prenatal care efforts aimed at preventing adverse outcomes that may occur when glucose is inadequately controlled early in pregnancy (*2,4,6*). Timely diabetes screening is essential for appropriate identification and treatment of gestational diabetes (*4,5*). Increased outreach efforts to provide care to the populations least likely to obtain care and accurate recording of diabetes and prenatal care use on the birth certificate should contribute to improvements in diabetes surveillance and improved pregnancy outcomes.

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